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Assessing the Interference of Stereotypy During Unmastered Academic Tasks

A Thesis
by
Taylor A. LaBour

Submitted to the Faculty of the Department of Health Professions
at Rollins College in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF ARTS IN APPLIED BEHAVIOR ANALYSIS AND CLINICAL SCIENCE

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Abstract

Numerous studies have explored which treatments are most effective when treating stereotypy, but little research has been conducted on assessing if and when these interventions are needed. This study compared the levels of stereotypy engagement during unmastered academic tasks. Additionally, separate task conditions for compatible and incompatible responding were assessed to determine under which conditions stereotypy became suppressed. The participant of this study had a diagnosis of Autism Spectrum Disorder and engaged in vocal stereotypy that was automatically maintained. Engagement of vocal stereotypy occurred at a higher rate during the no-interaction condition and lower rates during both task conditions. Our assessment showed that formal intervention was not necessary for vocal stereotypy during academic instruction, but further evaluation of the instructional methods may be needed. This research expanded upon the current research on the assessment of stereotypy and when it is appropriate to provide formal intervention.

Keywords: autism spectrum disorder, functional analysis, tasks, stereotypy

Assessing the Interference of Stereotypy During Unmastered Academic Tasks

Stereotypy, a repetitive behavior that occurs without an apparent social function (Rapp & Vollmer, 2005), commonly affects the Autism Spectrum Disorder (ASD) population. Although there is substantial research about the types of interventions (e.g., response interruption and redirection, differential reinforcement of other behavior, and other types of consequence-based interventions) that are used to treat stereotypy (e.g., Ahrens et al., 2011; Dickman et al., 2012; Gibbs et al., 2018; Lanovaz, Sladeczek, & Rapp, 2011; Love et al., 2012; Wunderlich & Vollmer, 2015), there is little known about when and if it is necessary to provide treatment for stereotypy engagement.

When deciding which interventions are appropriate, professionals are ethically required to select the least-restrictive, most effective intervention for the problem behavior. However, professionals often select the intervention that will cause an immediate reduction in problem behavior instead of applying less-restrictive interventions prior. Pokorski and Barton (2020) evaluated if punishment procedures implemented in published research studies adhered to the ethical code. On average, published research studies on stereotypy only followed 51% (range, 33% to 64%) of the ethical standards used for punishment procedures. Of these 7 studies on stereotypy, only two report meeting Ethical Code 6¹ and three report meeting Ethical Code 13², both of which pertain to selecting appropriate interventions using the least restrictive intervention model (Pokorski & Barton, 2020).

Further, there are no set standards of when it is appropriate to intervene on the engagement of stereotypy. In many cases, studies published on the treatment of stereotypy will state that intervention is necessary because stereotypy is possibly interfering with skill

¹ “Reasonable rationale was provided for why the treatment was selected compared with other treatments” (Pokorski & Barton, 2020).

² “A systematic reinforcement-based procedure was used during baseline and did not reduce CB to or near zero OR a punishment-based procedure was selected as the initial treatment due to dangerous CB for which reinforcement alone was not effective” (Pokorski & Barton, 2020).

acquisition, social interactions, and/or appropriate communication (e.g., Ahearn et al., 2007; Boyle et al., 2020; DeRosa et al., 2019; Lanovaz et al., 2012; Shawler et al., 2019; Slaton & Hanley, 2016; Toper-Korkmaz et al., 2018). If additional information about the participant's stereotypy is provided, it typically includes the topography of stereotypy the participant is engaging in and the results of a functional analysis assessment if one was conducted.

However, just because stereotypy is occurring at substantial levels does not indicate that the behavior warrants intervention. For many individuals, stereotypy occurs at nonproblematic times (e.g., only when they are alone or in a barren environment), provides automatic reinforcement to the individual, and does not prevent the individual from accessing other social reinforcers or completing tasks. If the stereotypy is occurring at times that are problematic and providing treatment would benefit the individual by enhancing their skill acquisition and daily life, then intervention is warranted; if providing intervention for the individual's stereotypy will only improve the lives of those around them, then intervention should be cautioned against. For professionals, the individual being treated should be the primary focus and benefit the most from the intervention being applied (Green, 1990).

It is the ethical duty of professionals in the field of behavior analysis to provide the most effective treatment to clients, but first determining whether the behavior warrants intervention must occur. If not, a clear picture cannot be provided of if the stereotypy is affecting the skill acquisition, social interaction, or communication.

In an effort to address this limitation of stereotypy research, Cook and Rapp (2020) evaluated stereotypy engagement in a multi-phase assessment to determine if each participant's stereotypy interfered with academic instruction, social interaction, or both. For one participant, formal intervention was unnecessary because the academic instruction administered during the assessment phase gradually decreased the participant's stereotypy engagement (Cook & Rapp, 2020). For the other participants, the authors determined that

stereotypy interfered with academic instruction due to the increase in engagement or continued engagement in stereotypy when academic tasks were presented. The experimenters used multiple intervention components to determine which intervention would be the most appropriate treatment for each participant's unique stereotypy following the assessment results. Similarly, in an unpublished study, Sloman et al. (2019) evaluated the results between indirect and direct assessments of stereotypy engagement to determine if the results of the intensity and interference of stereotypy engagement during the direct assessment would be similar to the results of the indirect assessments conducted prior. Additionally, the experimenters utilized a multielement design to determine if the percentage of stereotypy engagement interfered with appropriate play, communication, or previously mastered skills (Sloman et al., 2019). Only one of four participants displayed stereotypy that interfered with daily activities (academic tasks) and required behavioral intervention.

One methodological component that warrants further study in this line of research is the selection of demands to use in the demand analysis. Cook and Rapp (2018) selected demands for use in their study by using the participant's standard academic program. However, some of these demands were likely incompatible with the participant's stereotypy, whereas demands for other participants were not. For example, a suppression in stereotypy was shown for one participant with vocal stereotypy, Bentley, when the academic tasks selected included vocal imitation, therefore creating incompatible responding. The academic tasks selected for other participants did not include an incompatible response. For example, the targeted response for another participant, Aiden, was vocal stereotypy and the academic tasks selected included completing puzzles and motor imitation. Demands for this participant were not incompatible, and suppression of stereotypy did not occur (Cook & Rapp, 2018). This variation in response requirement among participants may not have accurately assessed the engagement of stereotypy and its effect on academic instruction.

Sloman et al. (2019) assessed the interference of stereotypy and compliance across multiple conditions. For the selection of tasks for academic instruction, researchers chose mastered tasks. This is worth noting because compliance to academic instruction during mastered tasks may not be indicative of the interference of the individual's stereotypy to academic instruction. Skills that are in the individual's behavioral repertoire may not evoke the engagement of stereotypy, whereas a novel or unmastered task make evoke or increase stereotypy engagement. Additionally, if the skill is mastered, we cannot be sure if any interference has occurred within their learning because it has already been acquired. Therefore, further study of stereotypy during the acquisition of unmastered tasks is warranted.

The purpose of this study was to expand upon the current research on assessing stereotypy and determining when or if intervention is needed, specifically during academic instruction. This was done by assessing the participants level of stereotypy engagement when presented with unmastered academic tasks that required either compatible or incompatible responding.

Method

Subjects and Setting

The participant for this study was a child recruited from a Central Florida clinic providing behavior analytic and academic services. Elizabeth was a 4-year-old female with a diagnosis of Autism Spectrum Disorder (ASD) whose vocal stereotypy consisted of repetitive noises, simple syllables, and approximations of excerpts from her favorite televisions shows and songs. A second subject (male, 6 years old) completed the preference assessments and functional analysis (FA), but discontinued attending sessions at the clinic and was excluded from the study.

All sessions were conducted in the session rooms of the clinic that the participant was recruited from. The session rooms contained typical materials found at an ABA clinic (e.g., tables, chairs, work material, etc.), a video camera, and a microphone. Sessions were 5 min in duration.

Response Measurement, Experimental Design, and Reliability

The dependent variables for this experiment were vocal stereotypy, correct responding during academic tasks, and on-task behavior during academic tasks. Data were collected using a handheld tablet or computer with a data collection program (Countee [Version 1.04; Peic Gavran & Hernandez, 2016]). The trained observers and data collectors for this study consisted of graduate students with extensive training in behavior analysis. Vocal stereotypy was defined as any instance of contextually inappropriate vocalization lasting at least 2-s. This included contextually inappropriate singing, babbling, or saying words or phrases unrelated to the present context. Repetitive sounds (humming) were also included. Occurrences of whining or crying were excluded, unless the participant engaged in vocal stereotypy simultaneously. Each occurrence of vocal stereotypy was recorded and then converted into a response rate (i.e. engagement of vocal stereotypy per minute). On-task behavior was defined as the participant sitting in their seat and engaging with the task materials or in the appropriate vocal response (either engaging in correct response or attempting to engage in the correct response). Behavior was considered off-task if the client left their seat, did not engage in a response within 5-s of the discriminative stimulus (SD) being presented, or if the SD was needed to be repeated for the participant to attend to the demand presented. On-task behavior was measured using a duration-per-occurrence recording. Observers activated a stopwatch on the data collection program on the occurrence of on-task behavior and stopped the stopwatch contingent upon the participant engaging in off-task behavior with a 3-s onset and offset. The total duration of on-task behavior per session

was calculated using the data collection program. A correct response in the compatible task condition was defined as touching the stimulus that corresponded to the spoken function within 5-s of the instructor delivering the SD. Self-correction was permissible if the subject touched the correct stimulus within 2-s of touching the incorrect stimulus. An incorrect response during the compatible task condition was defined as the participant touching the incorrect stimulus that did not match the spoken function or if no response was given within 5-s of the SD being delivered. Correct responding during the incompatible task condition was defined as the participant independently emitting the correct number within 5 s of the stimuli being presented. Self-correction was permitted if the participant engaged in the correct vocal response within 2 s of the incorrect response being emitted. An incorrect response was defined as the participant engaging in the incorrect vocal response that did not correspond with the number being presented or if no response was given. Correct responding during the demand evaluation was measured by calculating the percentage of correct independent responses per session. The number of correct responses was divided by the total number trial within the session and then multiplied by 100. Error-correction trials were not included in response measurement. Data were collected either in situ or through videotaped recordings of the sessions. A multielement design was used in both the functional analysis and demand evaluation.

A second observer independently collected data for 33% of sessions. Interobserver agreement (IOA) was calculated for the occurrence of vocal stereotypy, on-task academic tasks, and correct responding during academic tasks. IOA for vocal stereotypy and on-task behavior was calculated using a computer program that compares data collection on a second-by-second basis. The program computed the number of seconds with agreement divided by the total number of seconds in a session, and then multiplied by 100 to convert to a percentage. IOA for correct responding during task conditions was calculated comparing

the number of correct responses between the second observer and the primary observer, dividing the smaller value by the larger value, and then multiplying by 100%. Average IOA was 95% (range, 83%-100%) for the occurrence of vocal stereotypy, 97% (range, 85% to 100%) for correct responding during academic tasks, and 93% (range, 89% to 97%) for on-task behavior during academic instruction.

Procedural integrity data were collected on the correct implementation and termination of directions, delivery of prompts, and the delivery of praise during 33% of sessions. Procedural integrity data were calculated by dividing the number of responses that were provided with a correct consequence by the number of occurrences of vocal stereotypy or correct responses by the and then multiplied by 100 to be converted into a percentage. Procedural integrity indicated procedural integrity was at 100% across sessions in which procedural integrity was evaluated.

Functional Analysis

A FA was conducted to confirm that the participant's stereotypy was automatically maintained. Using the procedure described by Iwata et al., (1982/1994), this assessment included attention, demand, no interaction, and play conditions. These sessions were 5 min in duration.

For the attention condition, the instructor was seated in the room with the participant and appeared to be busy (e.g. reading a book or working on notes). Upon the participant's engagement in the target behavior, the instructor immediately delivered brief vocal attention. For the demand condition, the instructor presented the participant with a series of tasks in random order. A three-step prompting procedure (vocal, then model, and then physical guidance) was utilized by the instructor. Engagement in the target behavior resulted in the removal of task demands and task materials for 30-s. During the no-interaction condition, the instructor was seated in the room with the participant, and there were no leisure items

present. The instructor ignored any behavior emitted by the participant and did not deliver any programmed consequences for the target behavior. For the play condition, the instructor was seated with the participant at the table and interacted with the participant using a moderately preferred leisure item. During this condition the instructor delivered noncontingent vocal praise (e.g. “I love that toy!”) every 30 s and did not deliver any programmed consequences for target behavior.

An extended no-interaction condition was included to confirm that the participant’s vocal stereotypy occurred without social consequences, and further confirmed the behavior was automatically maintained (Vollmer, Marcus, Ringdahl, & Roane, 1995). These sessions were identical to the no-interaction condition in the FA.

Demand Evaluation

The task conditions were individualized according to the participant’s specific academic program. In identifying these tasks, we first consulted with the participant’s BCBA to determine which tasks the participant needed to improve on or had not yet acquired but were planned as future acquisition targets. We then selected two tasks: a task that was categorized as compatible and one that was categorized as incompatible. A compatible task was defined as a task that was possible to do while simultaneously engaging in stereotypy. Identifying objects by function was selected for this task condition. An incompatible task was a task that cannot be completed while simultaneously engaging in stereotypy. For this task condition, tacting number 11-20 was selected.

No Interaction. This condition was identical to the no-interaction condition in the functional analysis conducted prior to the study and served as a control for the task conditions. During this condition, the instructor did not interact with the participant or provide any consequences for stereotypy.

Task (Compatible Response). During this condition, the participant sat at the table with the instructor. During each trial, the instructor placed three 3x5 picture cards side-by-side in a random sequence on the table in front of the participant. The instructor then delivered the spoken SD (i.e. “Which one do we eat?”, “Which one do we swim in?”, etc.). If the participant responded correctly, the instructor provided verbal praise (e.g. “Good job!”) or physical attention (e.g. tickles or high-five) and then continued with the next trial. If the participant responded incorrectly or failed to emit a response, the instructor implemented a three-step prompting procedure (verbal prompt, model prompt, then physical guidance). Following the three-step prompting procedure, an error correction procedure was implemented in accordance with the participant’s academic program. The instructor would provide the correct response and gesture to the correct card. The instructor then re-presented the SD and waited 5-s for the participant to engage in a correct response. If a correct response occurred, the instructor delivered brief praise. If the participant engaged in an incorrect response, the instructor used full physical prompting for the participant to engage in the correct response. During this condition the inter-trial interval (ITI) varied based on the participant’s on-task behavior. There were no consequences delivered for any stereotypy in this condition.

Task (Incompatible Response). This condition was identical to the previous task condition except the academic task selected for this condition was tacting numbers 11-20. Stimuli for this condition consisted of 3x5 number cards that included the numbers eleven through twenty. During this condition, the participant and instructor sat at a table. The instructor presented the stimuli in a random order in front of the participant and delivered the SD “What number is this?” and waited 5-s for a response. If the participant correctly tacted the number, the instructor provided verbal praise or physical attention and then continued with the next trial. If the participant engaged in the incorrect response or no

response, the instructor implemented a three-step prompting procedure (re-presentation of the SD, partial-verbal prompt, then full-verbal prompt). Following an incorrect response, the instructor implemented an error correction procedure which consisted of the instructor providing the correct response, then re-presenting the SD and waiting 5-s for a response. If the participant engaged in a correct response, the instructor delivered brief praise and continued to the next trial. If an incorrect response was given, the instructor used full-verbal prompting to evoke the correct response. Identical to the compatible task condition, ITI varied based on the participant's on-task behavior and no consequences were delivered for stereotypy.

Results

The results for Elizabeth's FA can be seen in Figure 1. These data show undifferentiated results in the standard FA providing evidence that vocal stereotypy may be automatically maintained. High variability in the engagement of vocal stereotypy can be seen in the extended no-interaction condition indicating that behavior was not socially maintained.

Figure 2 displays the engagement of vocal stereotypy during the demand evaluation. High levels of stereotypy can be seen in the no interaction condition but low levels during both task conditions. This pattern of responding would indicate that stereotypy is likely not interfering with academic instruction and intervention would not be necessary. Results for the percentage of correct responding during the compatible and incompatible conditions can be seen in Figure 3. These data show undifferentiated results between the two task conditions. The average percentage of correct responding across all sessions for the compatible task condition was 48% (range, 28%-70%) and the average percentage of correct responding across all sessions for the incompatible task condition was 44.17% (range, 22.2%-77.7%). This data indicates that mastery for both target skills was not met. Figure 4 illustrates the

percentage of on-task behavior during the compatible and incompatible task conditions. The average percentage of on-task behavior for the compatible task condition was 70.49% (range, 42.3%- 91.3%) and the average percentage of on-task behavior for the incompatible task condition was 60.83% (range, 51.3%-87.7%). Results from both task conditions show a similar decreasing trend in on-task behavior across all sessions.

Discussion

Results for Elizabeth illustrated higher engagement of vocal stereotypy in the no-interaction condition and lower levels in the task conditions indicating that the engagement of vocal stereotypy was not interfering with academic instruction. These data are consistent with previous research and indicate that formal intervention is not needed (Sloman et al., 2019). This is important to note because intervention is not being implemented for a behavior that is occurring at nonproblematic times. This is different from previous literature, which implemented formal interventions based solely off of the behavioral topography and indirect assessments (Lanovaz, Sladeczek, & Rapp, 2011).

Additionally, mastery of the skills targeted in both task conditions of the demand evaluation did not occur. Failing to reach mastery criteria could indicate that the interventions being used to teach these skills are not effective for this participant. Therefore, assessing and modifying the participant's current interventions may be warranted for them to be taught more effectively. It is important to mention that the participant for this study, Elizabeth, had several health issues arise during the demand evaluation that at times challenged the progression of this study. This may have impeded skill acquisition because sessions were not being conducted consistently causing the participant to not continuously perform the skills being taught. The prompting strategy utilized during these tasks may have not been effective

with helping Elizabeth acquire the skills being taught. Due to the tasks being novel to this participant, a more intrusive prompting strategy may have been more effective during initial instruction. Additionally, the reinforcer used for this participant may not have been reinforcing enough. Although a preference assessment was conducted only once at the beginning of the study, the participant's preferences may have changed over time.

Results for the on-task behavior of Elizabeth illustrated a decreasing trend across both task conditions in the demand evaluation. This decrease in on-task behavior could indicate that the requirements of attending to academic instruction for 5 min were too high for this participant. However, baseline data were not collected on on-task behavior prior to conducting this study, so we cannot be sure the maximum time the participant has been able to sit and engage in on-task behavior. Additionally, pauses in data collection could have contributed to the decrease in on-task behavior during the demand evaluation because the client was also not attending regularly scheduled behavior therapy at the clinic, thus attending to academic instruction or engaging in on-task behavior was not a requirement for them during extended periods of time.

This study included a compatible and incompatible task in the demand evaluation to control for the response variation that could possibly impact the engagement of stereotypy (Cook & Rapp, 2018). While we cannot be certain that these tasks were equally difficult and required the same response effort, we took extensive measures to ensure they were not widely different. Tasks for the demand evaluation were selected in consultation with the participant's BCBA and were tasks that were being added to participants academic programming. In an attempt to control for potential history with previously presented tasks (i.e. tasks during the FA), novel tasks were presented during the demand evaluation.

The purpose of this study was to expand upon the research of Cook & Rapp (2018) and Sloman et al. (2019) by selecting academic tasks that are unmastered and by including a

task condition for both compatible and incompatible responding. Currently, there are very few studies exploring the assessment of the engagement of stereotypy and when it is appropriate to intervene. Further research into the assessment of when it is appropriate to provide treatment for stereotypy is crucial because we cannot be sure the interventions being used are appropriate if there is no way to accurately know if the behavior evoked is indeed interfering. This study was the first to assess and compare the level of engagement during academic tasks that require compatible and incompatible responding, therefore providing greater understanding into the type of intervention that may be the most effective.

There are some limitations to this study that should be noted. First, this assessment was only implemented with one participant, and only one type of behavioral topography for stereotypy was evaluated. By assessing only one topography, we cannot be sure that this assessment would be generalizable to other topographies of automatically maintained behavior (i.e. motor stereotypy, self-injurious behavior, etc.) or to other individuals. However, this study was developed as a pilot test to potentially implement with other individuals and does not claim generalizability to all topographies. Therefore, this assessment was individualized to this participant to evaluate their specific behavioral topography.

Another potential limitation of this study is the resources required to implement this assessment. Although sessions were only 5 min in duration, it took a total of thirty sessions to determine if stereotypy was interfering with the participant's academic instruction. While the results of this assessment were able to determine if formal intervention was needed, it may not be efficient for clinicians who are needing conclusive results after one session. Finally, the ITI's for both tasks conditions varying based on the client's behavior is an additional limitation because it may have contributed to the reduction in on-task behavior.

The results of this study are pertinent to practicing clinicians because it provides further evidence that the decision to provide formal intervention for stereotypy cannot be

determined based off of behavioral topography or indirect assessments alone. Additionally, professionals in the field of behavior analysis adhere to a strict ethical code, which includes providing clients with the most effective intervention. This assessment would provide an initial standard of when, or if, it would be appropriate to intervene on a client's stereotypy.

Although this study focused on engagement of stereotypy during academic tasks, levels of engagement could affect other crucial life skills like socialization or communication. For example, assessments evaluating the intensity in which stereotypy can appear aberrant to other individuals in social settings or assessing appropriate treatment for individuals with multiple forms of stereotypy in a specific setting. Extending the research and developing a more sophisticated assessment would provide greater understanding if the engagement of stereotypy is truly impacting crucial life skills and if so, what would be the most effective treatment for the areas that are currently being impacted.

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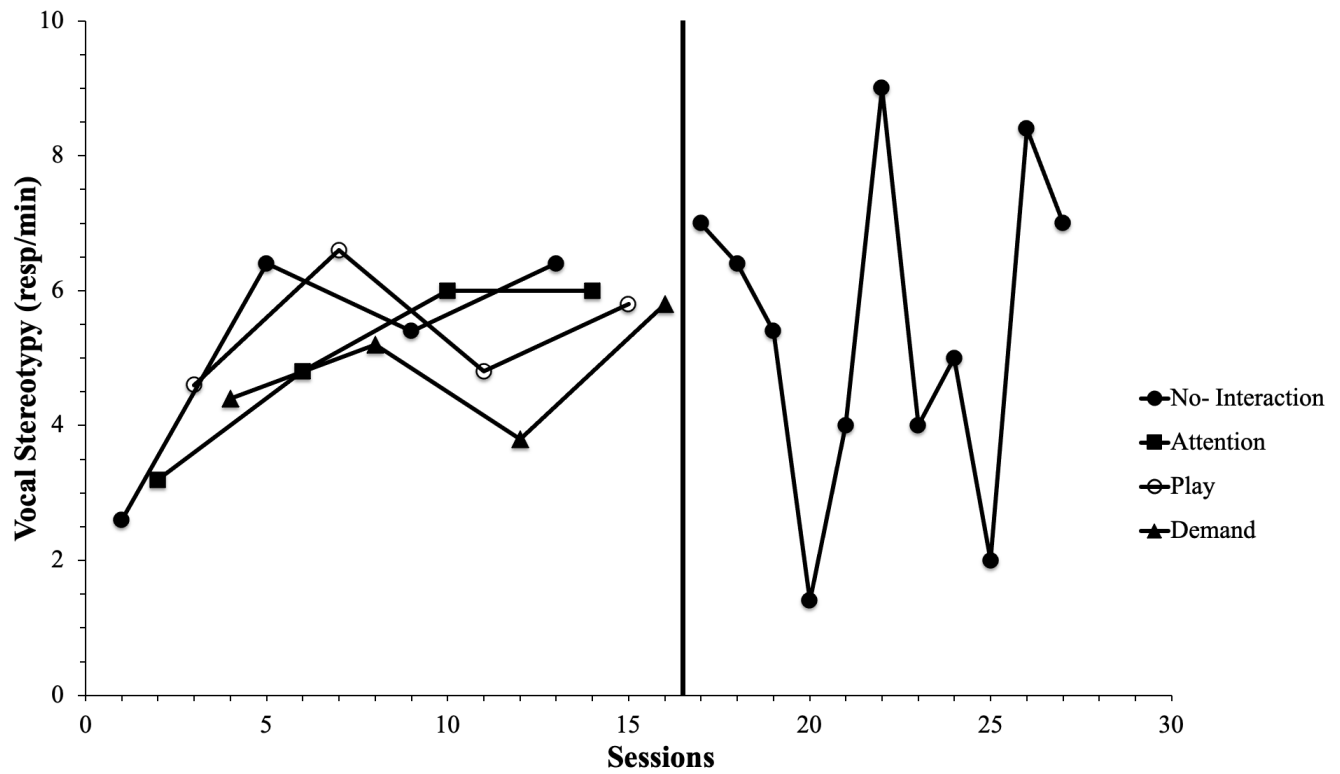
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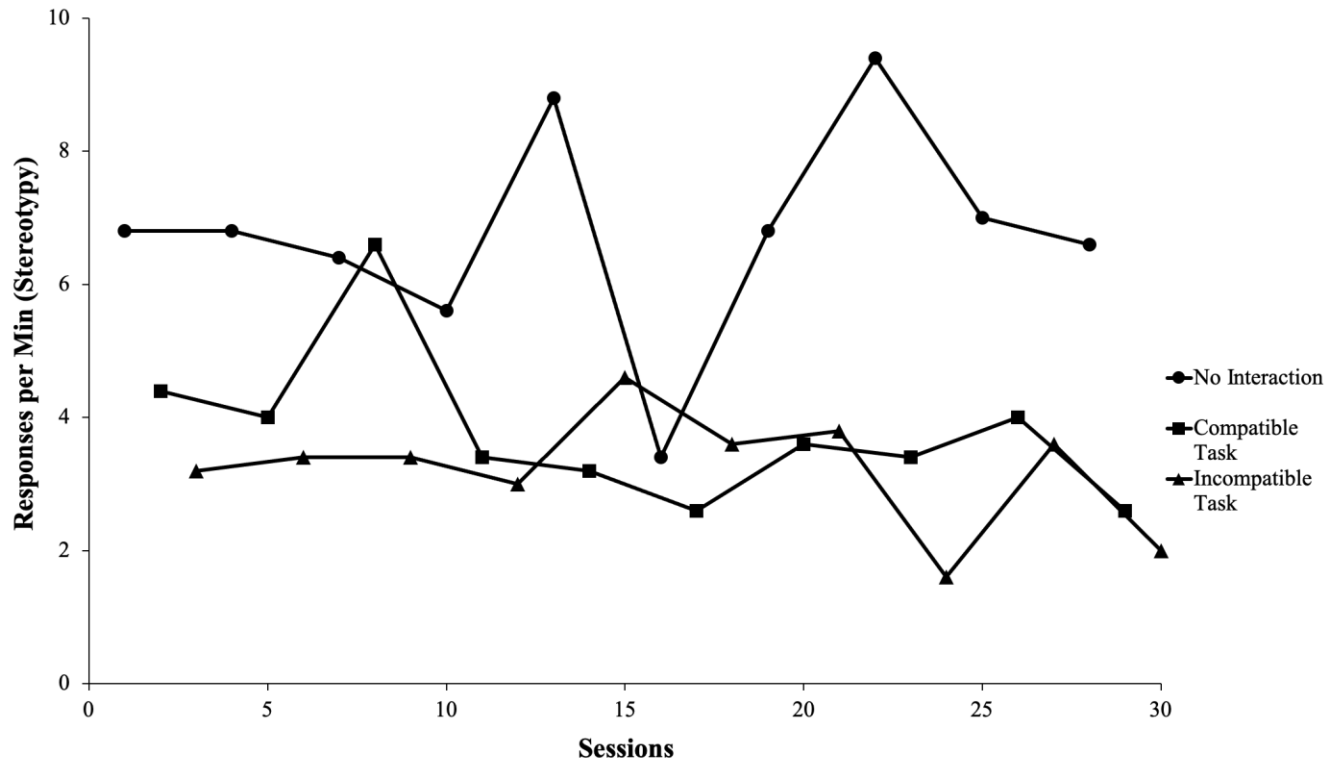
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Figure 1*Functional Analysis with Extended No-Interaction Condition*

Note. Rate of vocal stereotypy for no-interaction, attention, play, demand, and extended no-interaction conditions.

Figure 2

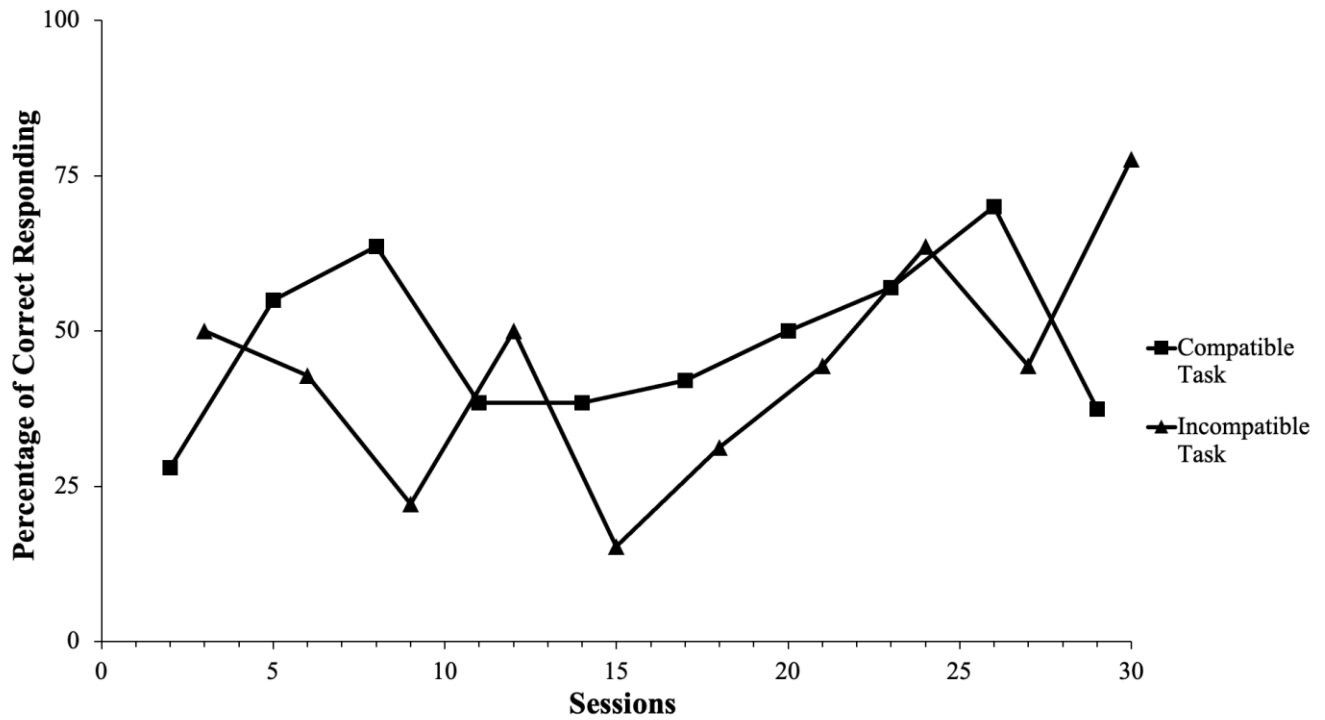
Assessment of Stereotypy Engagement During Unmastered Academic Tasks



Note. Level of vocal stereotypy engagement is shown for the no-interaction, task (Compatible), and task (Incompatible) conditions.

Figure 3

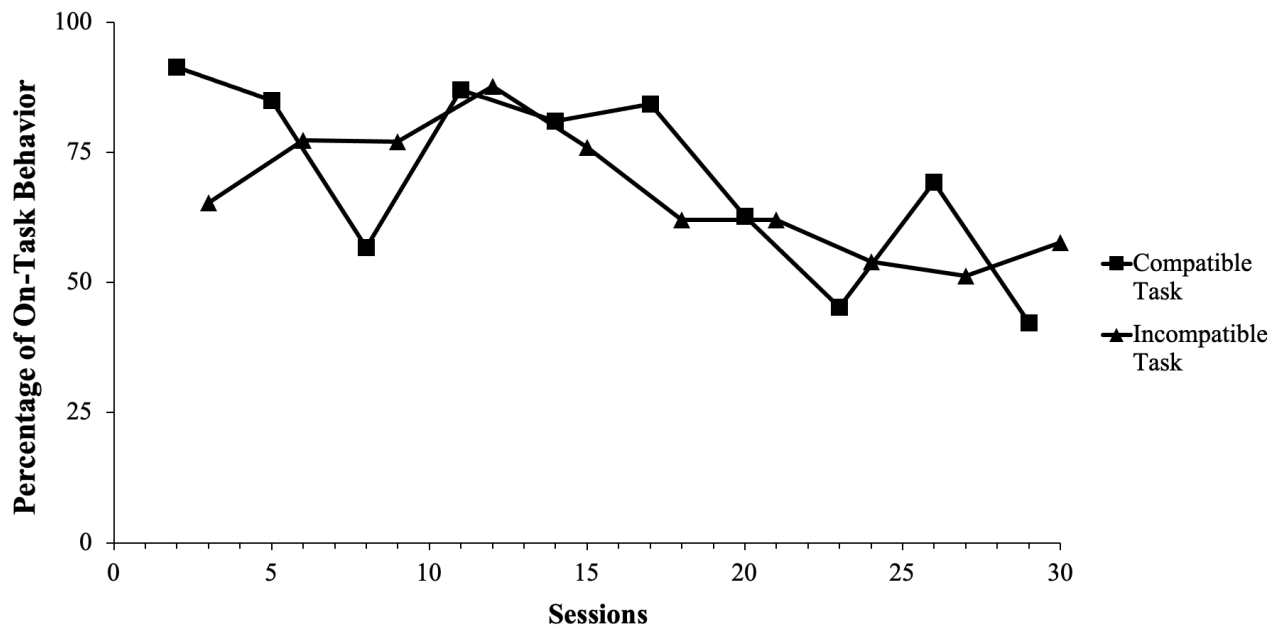
Percentage of Correct Responding During Unmastered Academic Tasks



Note. Percentage of correct responding across compatible task and incompatible task conditions.

Figure 4

Percentage of On-Task Behavior During Unmastered Academic Tasks



Note. Percentage of on-task behavior across compatible task and incompatible task conditions.